

**2D/3D CHEMICAL SENSORS AND METHODS OF FABRICATING
AND OPERATING THE SAME**

Abstract of the Disclosure

Chemical sensors include a flexible substrate, a flexible lower electrode on the flexible substrate, and a patterned flexible dielectric layer on the flexible lower electrode opposite the flexible substrate. A patterned flexible upper electrode also is 5 included on the patterned flexible dielectric layer opposite the flexible lower electrode. The patterned flexible dielectric layer and the patterned flexible upper electrode are patterned to establish a first current flow path between the flexible lower electrode and the patterned flexible upper electrode through the chemical, if present, upon application of voltage between the flexible lower electrode and the patterned 10 flexible upper electrode. The flexible lower electrode also may be patterned to establish a second current flow path between portions of the patterned flexible lower electrode through the chemical, if present, upon application of voltage between the portions of the patterned flexible lower electrodes. The flexible upper electrode also may be patterned to establish a third current flow path between portions of the 15 patterned flexible upper electrode through the chemical, if present, upon application of voltage between the portions of the patterned flexible upper electrode. A rigid substrate also may be used.